PATENT ABSTRACTS OF JAPAN

(11) Publication number : 07-043584
(43) Date of publication of application : 14.02.1995

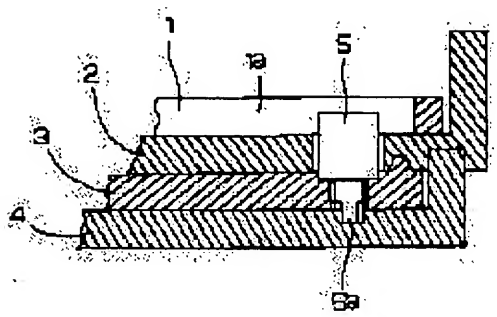
(51) Int.Cl. G02B 7/04
G02B 7/02

(21) Application number : 05-209930
(22) Date of filing : 02.08.1993

(71) Applicant : CANON INC
(72) Inventor : YAMAMOTO HARUSHIGE

(54) STRUCTURE OF LENS BARREL FOR CAMERA

(57) Abstract:
PURPOSE: To make cost low and to reduce assembly man-hour by decreasing the number of parts.
CONSTITUTION: In a camera provided with a differential barrel 3 which is turnably held on the inner peripheral surface of a fixed barrel 2 and whose position in an optical axis direction is regulated by its rotational phase, a straight advance guide 4 which is regulated corresponding to the position of the barrel 3 and whose rotational phase is regulated by the fixed barrel 2, a driving pin 5 which is positioned at the outer peripheral part of the fixed barrel 2 and fixed on the barrel 3, and a driving ring 1 applying force in a rotating direction to the pin 5; a projection 5a engaged in a groove part in a circumferential direction provided in the guide 4, turnably holding the guide 4 with respect to the barrel 3 and preventing slip-off is provided at the tip of the pin 5.



LEGAL STATUS

[Date of request for examination]	29.09.1997
[Date of sending the examiner's decision of rejection]	
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]	
[Date of final disposal for application]	
[Patent number]	3008741
[Date of registration]	03.12.1999
[Number of appeal against examiner's decision of rejection]	
[Date of requesting appeal against examiner's decision of rejection]	
[Date of extinction of right]	

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] A fixed cylinder which held taking-lens optical system and was fixed to a main part of a camera A differential cylinder in which that direction location of an optical axis is specified with that rotation phase while being held free [rotation to inner skin of this fixed cylinder] A rectilinear propagation guide to which a rotation phase is specified by said fixed cylinder while being located in an inner circumference side of this differential cylinder and specifying that direction location of an optical axis corresponding to a location of said differential cylinder A drive pin which was located in the periphery section of said fixed cylinder, and was fixed to said differential cylinder A drive ring which gives force of a hand of cut to this drive pin It is the lens-barrel structure of a camera equipped with the above, and is characterized by preparing a projection which engages with a slot of a circumferencial direction established in said rectilinear propagation guide, and holds this rectilinear propagation guide free [rotation] to said differential cylinder, and performs an omission stop at a tip of said drive pin.
[Claim 2] A fixed cylinder which held taking-lens optical system and was fixed to a main part of a camera A differential cylinder in which that direction location of an optical axis is specified with that rotation phase while being held free [rotation to inner skin of this fixed cylinder] A rectilinear propagation guide to which a rotation phase is specified by said fixed cylinder while being located in an inner circumference side of this differential cylinder and specifying that direction location of an optical axis corresponding to a location of said differential cylinder At least two lens group attachment components to which the optical location is specified by cam groove formed in said differential cylinder while rotation regulation is carried out with said rectilinear propagation guide It is the lens-barrel structure of a camera equipped with the above, and said rectilinear propagation guide is characterized by forming in said rectilinear propagation slot and equiphase the key section which regulates rotation of this rectilinear propagation guide itself while it has a rectilinear propagation slot which regulates rotation of said lens group attachment component.
[Claim 3] A fixed cylinder which held taking-lens optical system and was fixed to a main part of a camera A differential cylinder in which that direction location of an optical axis is specified with that rotation phase while being held free [rotation to inner skin of this fixed cylinder] A rectilinear propagation guide to which a rotation phase is specified by said fixed cylinder while being located in an inner circumference side of this differential cylinder and specifying that direction location of an optical axis corresponding to a location of said differential cylinder A drive pin which was located in the periphery section of said fixed cylinder, and was fixed to said differential cylinder A drive ring which gives force of a hand of cut to this drive pin It is the lens-barrel structure of a camera equipped with the above, while helicoid association of said fixed cylinder and differential cylinder is carried out, this fixed cylinder has a slot which said drive pin penetrates, and as for said drive pin, this slot is characterized by being formed so that it may not fit in.
[Claim 4] A fixed cylinder which held taking-lens optical system and was fixed to a main part of a camera A differential cylinder in which that direction location of an optical axis is specified with that rotation phase while being held free [rotation to inner skin of this fixed cylinder] A rectilinear propagation guide to which a rotation phase is specified by said fixed cylinder while being located in an inner circumference side of this differential cylinder and specifying that direction location of an optical axis corresponding to a location of said differential cylinder A rectilinear propagation slot formed in said rectilinear propagation guide At least two lens group attachment components to which an optical location is specified by a pin formed in the periphery section engaging with a cam groove formed in said differential cylinder It is the lens-barrel structure of a camera equipped with the above, and is characterized by forming said pin in said lens group attachment component and one even in a portion which engages with said rectilinear propagation guide at least.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the lens-barrel structure of a camera.
[0002]
[Description of the Prior Art] Drawing 3 is some cross sections showing the lens-barrel structure of the conventional camera. 101 A drive ring, The fixed cylinder which 102 fits the drive ring 101 into a peripheral face, and is fixed to the main part of a camera, The differential cylinder which it lets out, 103 being located in the inner circumference section of the fixed cylinder 102, and rotating to this fixed cylinder, The rectilinear propagation guide with which regulation of a hand of cut is performed when the projected part for engagement which is not illustrated to the key seat which let out 104 to the differential cylinder 103 and one, and was prepared in said fixed cylinder 102 is engaged, 105 is a drive pin which carries out screw association at said differential cylinder 103, engages with cam-groove section 102a prepared in said fixed cylinder 102, and engages the tip with rectilinear propagation slot 101a of the drive ring 101 further.
[0003] Each lens group attachment component which is not illustrated is having the location regulated by the cam groove which was formed in the rectilinear propagation slot (not shown) of said rectilinear propagation guide 104, and the inner circumference section of said differential cylinder 103 and which is not illustrated. By driving by the driving means which does not illustrate said drive ring 101, said drive pin 105 lets out along with cam-groove 102a of the fixed cylinder 102, and as a result, it lets out the differential cylinder 103, rotating.
[0004] At this time, the rectilinear propagation guide 104 fixes at said drive pin 105, and since the projected part for engagement in which that end was formed in the shape of L character and which is not illustrated although it escapes and being let out with the differential cylinder 103 according to an operation of the stop member 106 is engaging with the rectilinear propagation guide key seat of the fixed cylinder 102, it will let out rotation by the differential cylinder 103 and one without carrying out. By relative rotation of this differential cylinder 103 and the rectilinear propagation guide 104, it lets out each lens group attachment component further within a differential cylinder, and the so-called differential zoom is performed.
[0005] Drawing 4 has composition which fixes the rectilinear propagation guide omission stop member 106 to screw hole 104c which prepared flange 104a in said rectilinear propagation guide 104, and was prepared in this flange 104a with a screw 107.
[0006] Some cross sections in which drawing 5 shows another conventional example, and drawing 6 are the decomposition perspective diagram.
[0007] In drawing 5 and drawing 6 which gave the same sign to the same portion as said drawing 3 , and omitted duplication explanation, the rectilinear propagation guide 104 is located in the inner circumference section of 1 lens group attachment component 107, key-seat section 107a of this 1 lens group attachment component 107 and height 104a of the rectilinear propagation guide 104 carry out key association, and rotation regulation of 1 lens group attachment component 107 is performed.
[0008] Similarly, each key-seat section 111a and 112a carries out key association also of 2 lens groups attachment component 111 and the 3 lens groups attachment component 112 with height 104a of said rectilinear propagation guide 104, and rotation regulation is performed.
[0009] It is the projection which formed in the holder of 1 lens group 110 the panel which attached 108 in the front end of 1 lens group attachment component 107, and 109, and formed 113,114,115 in 1 lens group attachment component 107, 2 lens groups attachment component 111, and 3 lens groups attachment component 112, and this the projection 113,114,115 of each is engaging with the crevice formed in the inside of the differential cylinder 103.
[0010]
[Problem(s) to be Solved by the Invention] However, in the above-mentioned conventional example, it escaped, the stop member 106 was needed, and there was a trouble of increase of the increase of components and the number of assemblers which fixes at (1) drive pin 105.
[0011] (2) Since it is required, it becomes impossible, as for the (b) 1 lens group attachment component 107, for the notching-like key seats 111a and 112a to use a space for inner skin effectively especially in the conventional example shown in drawing 5 and drawing 6 at the notching-like key seats 107a and 2 and the periphery of 3 lens groups attachment component 111,112.
[0012] (b) As for the rectilinear propagation guide 104, the point is not connected in the shape of a round ring. Therefore, in a point, in order to perform rotation regulation of each of said lens group, it is necessary to thicken thickness of root Motobe part 104b, and becomes disadvantageous on a space. Moreover, since the point was not connected in the shape of a ring, there was a trouble of being hard to send components dimensional accuracy.
[0013] (3) Cam-groove 102a formed in the fixed cylinder 102 is faced performing mold shaping, in order to avoid a mold structure top undercut, it can do the so-called mold rate section in the middle of a cam groove, and a stage is generated into the portion and it cannot optical location guarantee it in the location. Then, it was necessary to carry out post processing of the cam groove, and there was a

trouble that components will become expensive.
[0014] (4) In order to solve the trouble of the above-mentioned (2), the pin 116,117,118 which located the rectilinear propagation guide 104 in the periphery section of 1 lens group attachment component 107, 2 lens groups attachment component 111, and 3 lens groups attachment component 112 as shown in drawing 7 It is made to engage with the cam-groove sections 103a, 103b, and 103c of rectilinear propagation slot 104a of said rectilinear propagation guide 104, and the differential cylinder 103, and when it constitutes so that the location may be specified, the following troubles occur.
[0015] When the tip of 1 lens group attachment component 107 is thrown at the carrying midst of a camera at a desk etc., the impulse force is responded to by a pin 116 and cam-groove section 103a. Since it is separated from screw stop section 107a which is carrying out the screw stop of the portion which responds to this impulse force, and the pin 116 to 1 lens group attachment component 107 at this time by the thickness of said rectilinear propagation guide 104, in addition to impulse force, the moment force joins the screw section and it has a reinforcement top problem by association only in the thick portion of said 1 lens group attachment component 107.

[0016] Furthermore, in order to solve this problem, the nut has been arranged in the inner circumference section of 1 lens group attachment component 107, and when it was made structure which puts said 1 lens group attachment component 107 with a pin 116 and a nut (not shown), since the notching section the increase of the increase of components and cost and for escaping this nut section further was needed for 2 lens groups attachment component 111, there was a trouble on space efficiency like the above-mentioned (2).

[0017] This invention aims at acquiring the lens-barrel structure of the camera which canceled the above troubles.
[0018]
[Means for Solving the Problem] While being held free [rotation to inner skin of a fixed cylinder which held taking-lens optical system and was fixed to a main part of a camera, and this fixed cylinder] according to invention of claim 1 A differential cylinder in which that direction location of an optical axis is specified with that rotation phase, and a rectilinear propagation guide to which a rotation phase is specified by said fixed cylinder while being located in an inner circumference side of this differential cylinder and specifying that direction location of an optical axis corresponding to a location of said differential cylinder, In a camera which has a drive pin which was located in the periphery section of said fixed cylinder, and was fixed to said differential cylinder, and a drive ring which gives force of a hand of cut to this drive pin It becomes mitigable [a cost cut and the number of assemblers] by having prepared a projection which engages with a slot of a circumferencial direction established in said rectilinear propagation guide, and holds this rectilinear propagation guide free [rotation] to said differential cylinder, and performs an omission stop at a tip of said drive pin.
[0019] While being held free [rotation to inner skin of a fixed cylinder which held taking-lens optical system and was fixed to a main part of a camera, and this fixed cylinder] according to invention of claim 2 A differential cylinder in which that direction location of an optical axis is specified with that rotation phase, and a rectilinear propagation guide to which a rotation phase is specified by said fixed cylinder while being located in an inner circumference side of this differential cylinder and specifying that direction location of an optical axis corresponding to a location of said differential cylinder, In a camera which has at least two lens group attachment components to which the optical location is specified by cam groove formed in said differential cylinder while rotation regulation is carried out with said rectilinear propagation guide While said rectilinear propagation guide has a rectilinear propagation slot which regulates rotation of said lens group attachment component, by having formed in said rectilinear propagation slot and equiphase the key section which regulates rotation of this rectilinear propagation guide itself, improvement in space efficiency, improvement in components precision, and improvement in productivity of it are attained.
[0020] While being held free [rotation to inner skin of a fixed cylinder which held taking-lens optical system and was fixed to a main part of a camera, and this fixed cylinder] according to invention of claim 3 A differential cylinder in which that direction location of an optical axis is specified with that rotation phase, and a rectilinear propagation guide to which a rotation phase is specified by said fixed cylinder while being located in an inner circumference side of this differential cylinder and specifying that direction location of an optical axis corresponding to a location of said differential cylinder, In a camera which has a drive pin which was located in the periphery section of said fixed cylinder, and was fixed to said differential cylinder, and a drive ring which gives force of a hand of cut to this drive pin, while helicoid association is carried out, said fixed cylinder and differential cylinder This fixed cylinder has a slot which said drive pin penetrates, and this slot can realize a camera excellent in pair impact nature by being formed so that it may not fit in with said drive pin.
[0021] While being held free [rotation to inner skin of a fixed cylinder which held taking-lens optical system and was fixed to a main part of a camera, and this fixed cylinder] according to invention of claim 4 A differential cylinder in which that direction location of an optical axis is specified with that rotation phase, and a rectilinear propagation guide to which a rotation phase is specified by said fixed cylinder while being located in an inner circumference side of this differential cylinder and specifying that direction location of an optical axis corresponding to a location of said differential cylinder, In a camera which has at least two lens group attachment components to which an optical location is specified by a pin formed in the periphery section engaging with a rectilinear propagation slot formed in said rectilinear propagation guide, and a cam groove formed in said differential cylinder By forming in said lens group attachment component and one even a portion which engages with said rectilinear propagation guide at least, said pin is excellent in pair impact nature, and can realize an advantageous camera also in space.
[0022]
[Example] The important section cross section in which drawing 1 shows the example of this invention, and drawing 2 are the decomposition perspective diagram.
[0023] in drawing 1 and drawing 2 , 1 is a drive ring which the force from the driving source which is not is given through a well-known power means of communication without a drawing example, and rotates a drawing example, and the rectilinear propagation slots 1a, 1b, and 1c established in this drive ring 1 engage with the after-mentioned drive pin 5, and give turning effort. 2 is a fixed cylinder fixed to the main part of a camera which is not illustrated, and while enabling fitting maintenance of the rotation of said drive

ring 1 at the peripheral face of this fixed cylinder 2, three scalpel helicoid 2a is formed.
[0024] 3 is a differential cylinder which fits in inside the fixed cylinder 2, and helicoid association of this differential cylinder 3 is carried out with scalpel helicoid 2a corresponding to each in three male helicoid 3a formed in edge external surface. Moreover, slot 2b which said drive pin 5 penetrates is formed in the above-mentioned fixed cylinder 2, the drive pin 5 penetrates this slot and the point fits into rectilinear propagation slot 1a of said drive ring 1.
[0025] 4 is a rectilinear propagation guide fitting maintenance of the rotation of in the inner circumference section of said differential cylinder 3 is enabled. 5 is the drive pin which penetrated slot 2b of rectilinear propagation slot 1a of the drive ring 1, and the fixed cylinder 2, and was screwed in tapped hole 3b of the differential cylinder 3, and projected part 5a formed in the screw point of the drive pin 5 which penetrated tapped hole 3b is engaging with three circumferencial direction slot 4a formed near the back end section of the rectilinear propagation guide 4.
[0026] Therefore, the rectilinear propagation guide 4 is interlocked with the differential cylinder 3, and it lets it out. At this time, it is as in phase as rectilinear propagation slot 4b of the rectilinear propagation guide 4, and since three projection 4c formed in that back end section is engaging with rectilinear propagation slot 2c formed in the inner circumference section of said fixed cylinder 2, it is interlocked with said differential cylinder 3, without rotating, and moves in the direction of an optical axis.
[0027] 6 is 1 lens group attachment component holding 1 lens group which is not illustrated, three cylindrical projection 6a which engages with rectilinear propagation slot 4b of said rectilinear propagation guide 4 is formed in the abbreviation back end section of this 1 lens group attachment component 6, and the pin 7 which engages with the well-known cam groove which was formed in the inner circumference section of the differential cylinder 3, and which is not illustrated is inserted in the point of this cylindrical projection 6a.
[0028] 8 is 2 lens groups attachment component possessing the lens drive unit for doubling a focus with a well-known shutter drive unit and a well-known photographic subject. In the periphery abbreviation back end section of this 2 lens groups attachment component 8 Pin 8b which engages with the cam groove which was formed in the inner circumference section of approximate circle pillar-shaped projection 8a which engages with rectilinear propagation slot 4b of the rectilinear propagation guide 4 like said 1 lens group attachment component 6, and the differential cylinder 3, and which is not illustrated is formed in one.
[0029] 9 is 3 group attachment component holding 3 lens groups, and the same approximate circle pillar-shaped projection 9a as 2 lens groups attachment component 8 and pin 9b are formed in the periphery section of this 3 lens groups attachment component at one.
[0030] And as each approximate circle pillar-shaped projection and pin of the aforementioned 1 lens group attachment component 6, 2 lens groups attachment component 8, and 3 lens groups attachment component 9 pass through and escape from 4d of bore notches of height 4c of said rectilinear propagation guide 4, they are incorporated from back. At this time, it has escaped from the cam groove which was formed in the inner skin of said differential cylinder 3 and which is not illustrated to the back end section in the direction of an optical axis so that said each lens group attachment component can be incorporated from back. And the phase incorporating each lens group attachment component is outside the zoom field of a camera.
[0031] Next, zooming actuation of the zoom lens lens-barrel which consists of the above-mentioned example configuration is explained.
[0032] When the drive ring 1 rotates in response to the driving force from the driving source which is not illustrated, the drive pin 5 which engaged with rectilinear propagation slot 1a rotates, and coincidence is made to rotate the differential cylinder 3. Since helicoid association of male helicoid section 3a of this differential cylinder 3 and the scalpel helicoid section 2a of the fixed cylinder 2 is carried out, along with a helicoid, it lets out the differential cylinder 3 to the fixed cylinder 2.
[0033] Since, as for the rectilinear propagation guide 4, screw point 5a of said drive pin 5 is being engaged at circumference slot 4a at this time, it interlocks and lets out to said differential cylinder 3. Although it lets out while said differential cylinder 3 rotates to the fixed cylinder 2, since height 4c is engaging with rectilinear propagation slot 2e formed in the inner circumference section of the fixed cylinder 2, it will let out the rectilinear propagation guide 4, without rotating to the fixed cylinder 2.
[0034] Consequently, the differential cylinder 3 and the rectilinear propagation guide 4 will rotate relatively. Said each lens group attachment components 6, 8, and 9 are that the cylindrical projections 6a, 8a, and 9a engage with rectilinear propagation slot 4b of the rectilinear propagation guide 4, the rotation is regulated, it is engaging with the cam groove by which Pins' 7, 8b, and 9b were formed in the inner skin of the differential cylinder 3 and which is not illustrated further, and the direction location of an optical axis is specified.
[0035] For this reason, each lens group moves in the direction of an optical axis along with the locus of the cam groove formed in said differential cylinder 3 by relative rotation of said rectilinear propagation guide 4 and differential cylinder 3. At this time, the amount which applied the amount of deliveries of said differential cylinder 3 turns into movement magnitude of each lens group, and the cam groove of said differential cylinder inner skin is formed so that it may be in agreement with the amount as which this amount was determined on the optical design. Each lens group performs predetermined zoom actuation by the above actuation.
[0036] In the above-mentioned example, although the pins 7, 8b, and 9b prepared in each lens group attachment components 6, 8, and 9 are taper-like cone koro, the configuration of cylindrical koro like the drive pin 5 or others is sufficient as this.
[0037] Moreover, in the above-mentioned example, as long as the approximate circle pillar-shaped projections 6a, 8a, and 9a formed in each lens group attachment components 6, 8, and 9 are the configurations which can engage with rectilinear propagation slot 4b of the rectilinear propagation guide 4, a square pole configuration and other configurations are sufficient as them.
[0038]
[Effect of the Invention] Since it constituted according to invention of claim 1 so that the projected part which engages with the circumferencial direction slot of a rectilinear propagation guide might be prepared in the screw point of a drive pin and the omission stop of a rectilinear propagation guide might be performed as explained above, components mark are lessened and it becomes mitigable [a cost cut and the number of assemblers].
[0039] Since according to invention of claim 2 it constituted so that it might carry out forming the rectilinear-propagation slot of a rectilinear propagation guide to the back end section, enabling it to incorporate each lens group attachment component from back,

forming the key-like projected part which regulates rotation of the rectilinear propagation guide itself in the abbreviation back end section of a rectilinear propagation guide, and tying meat to a rectilinear-propagation slot by this projected part as it is possible, it becomes that improvement in space efficiency, improvement in components precision, and improvement in productivity are possible.
[0040] Since according to invention of claim 3 helicoid association of a fixed cylinder and the differential cylinder was carried out and the relief groove which a drive pin penetrates was formed in the fixed cylinder in accordance with the helicoid lead, the problem on the mold structure for mold-izing components is solved, and it becomes improvement in optical-character ability. Moreover, since a drive pin will absorb the above-mentioned impulse force in contact with the relief groove of a fixed cylinder according to the impulse force when throwing the lens-barrel point of a camera for a desk etc. if a helicoid is falling out in case a camera is carried, while the camera excellent in pair impact nature is realizable, even if **** by the drive pin remains in a relief groove according to the impulse force, it does not become a problem at all on optical-character ability.
[0041] Since the pin formed in the rectilinear propagation slot formed in the rectilinear propagation guide at the periphery section of a lens attachment component was considered as the engaged configuration according to invention of claim 4, like the above, it excels in pair impact nature, there is no necessity for the nut for a rise on the strength, and it is advantageous also in space.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The cross section of an important section showing the lens-barrel structure of a camera where this invention was carried out
[Drawing 2] The decomposition perspective diagram of the important section
[Drawing 3] Some cross sections showing the lens-barrel structure of the conventional camera
[Drawing 4] The cross section which transformed a part of drawing 3
[Drawing 5] Some cross sections showing other lens-barrel structures of the conventional camera
[Drawing 6] The decomposition perspective diagram of drawing 5
[Drawing 7] Some cross sections showing the lens-barrel structure of further others of the conventional camera
[Description of Notations]
1 Drive Ring
2 Fixed Cylinder
3 Differential Cylinder
4 Rectilinear Propagation Guide
5 Drive Pin
6 One Lens Group Attachment Component
7, 8b, 9b Pin
8 Two Lens Groups Attachment Component
9 Three Lens Groups Attachment Component

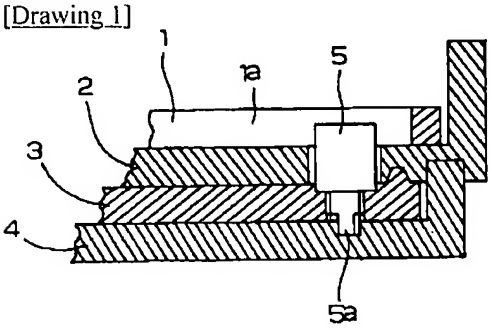
[Translation done.]

* NOTICES *

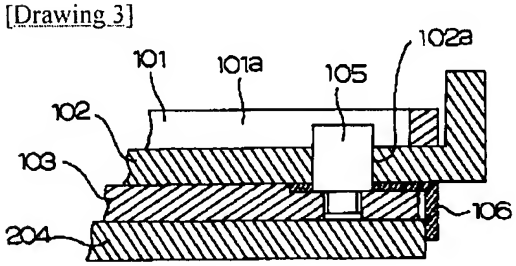
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

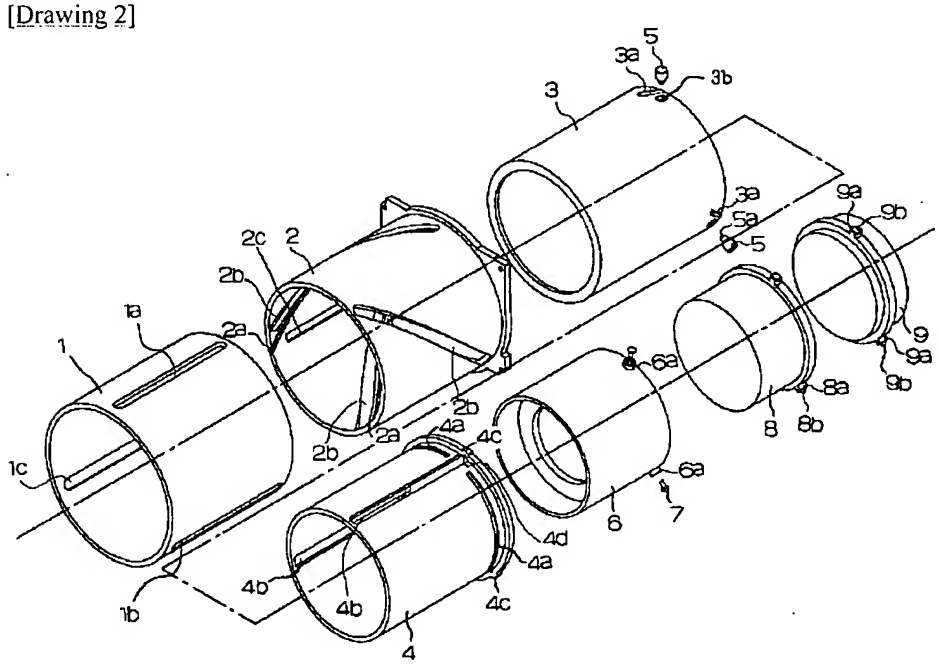
[Drawing 1]



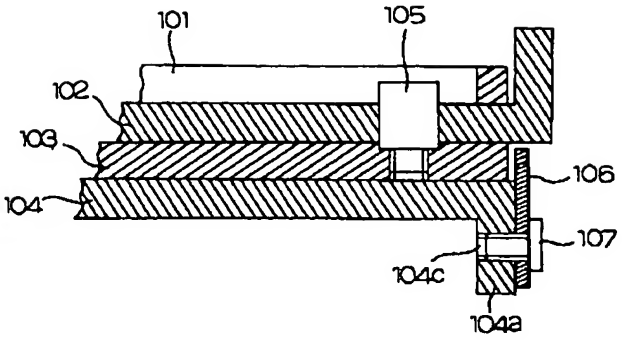
[Drawing 3]



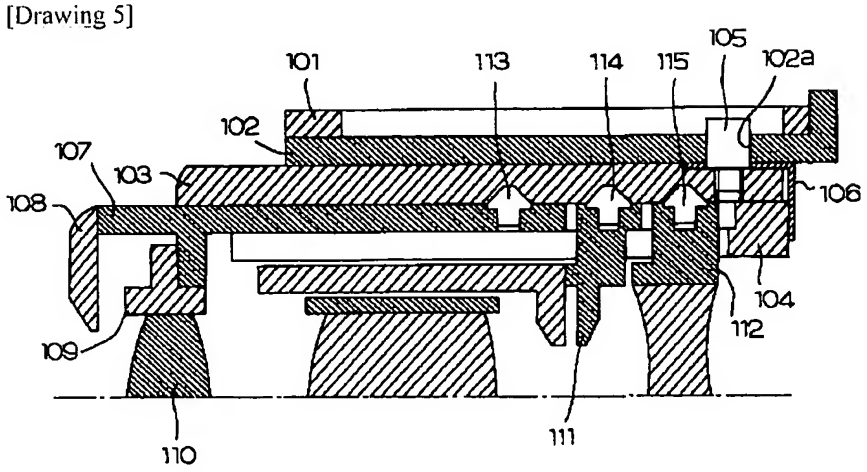
[Drawing 2]



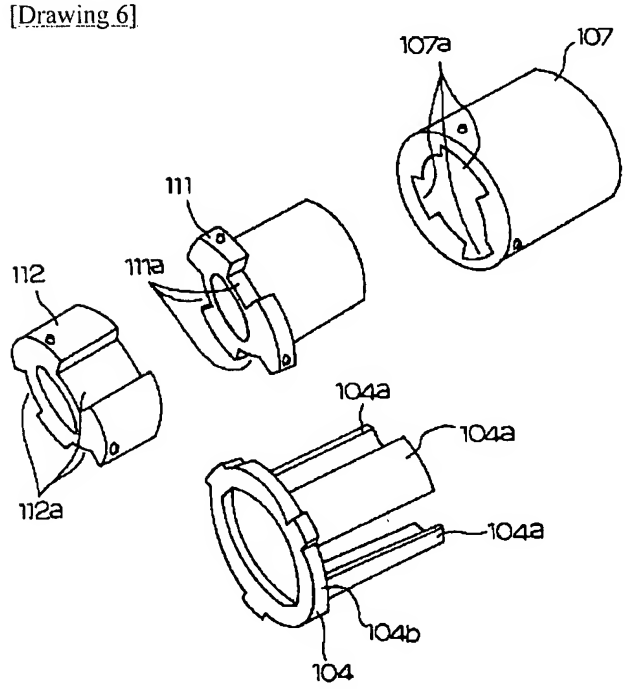
[Drawing 4]



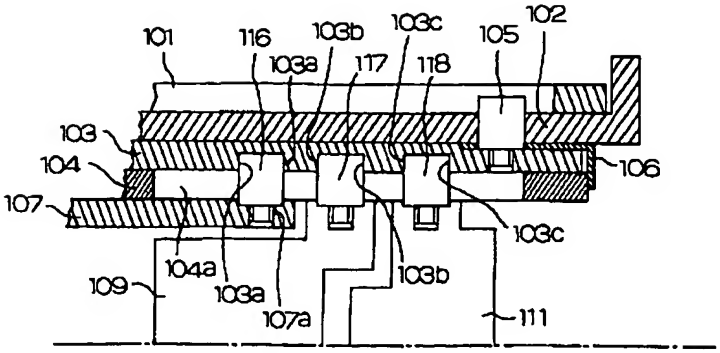
[Drawing 5]



[Drawing 6]



[Drawing 7]



[Translation done.]

CORRECTION OR AMENDMENT

[Official Gazette Type] Printing of amendment by the convention of 2 of Article 17 of patent law
[Section partition] The 2nd partition of the 6th section
[Date of issue] April 9, Heisei 11 (1999)

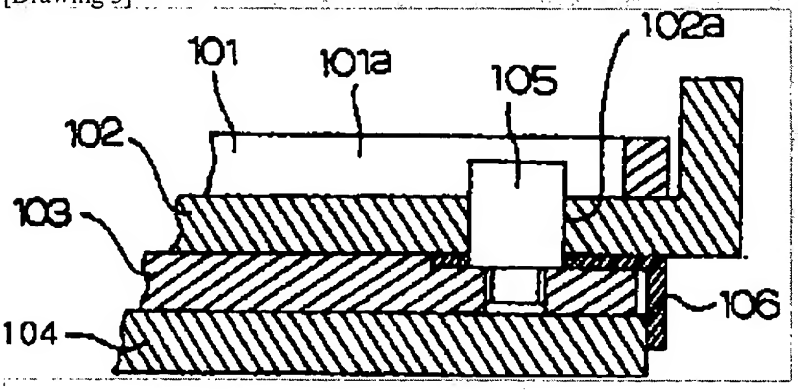
[Publication No.] Publication number 7-43584
[Date of Publication] February 14, Heisei 7 (1995)
[Year copy format] Open patent official report 7-436
[Filing Number] Japanese Patent Application No. 5-209930
[International Patent Classification (6th Edition)]

G02B 7/04
7/02

[FI]

G02B 7/04 D
7/02 A

[Procedure revision]
[Filing Date] September 29, Heisei 9
[Procedure amendment 1]
[Document to be Amended] Specification
[Item(s) to be Amended] 0029
[Method of Amendment] Modification
[Proposed Amendment]
[0029] 9 is 3 lens groups attachment component holding 3 lens groups, and the same approximate circle pillar-shaped projection 9a as 2 lens groups attachment component 8 and pin 9b are formed in the periphery section of this 3 lens groups attachment component at one.
[Procedure amendment 2]
[Document to be Amended] DRAWINGS
[Item(s) to be Amended] drawing 3
[Method of Amendment] Modification
[Proposed Amendment]
[Drawing 3]



[Translation done.]

(19)日本国特許庁（ＪＰ）　(12) 公開特許公報（A）　(11)特許出願公開番号

特開平7－43584

(43)公開日　平成７年(1995)２月14日

(51)Int.Cl.[6]	識別記号	庁内整理番号	ＦＩ	技術表示箇所
Ｇ０２Ｂ　7/04				
7/02	Ａ			
			Ｇ０２Ｂ　7/04	Ｄ

審査請求　未請求　請求項の数４　ＦＤ　（全 ７ 頁）

(21)出願番号　特願平5－209930

(22)出願日　平成５年(1993)８月２日

(71)出願人　000001007
キヤノン株式会社
東京都大田区下丸子３丁目30番２号

(72)発明者　山本　晴滋
東京都大田区下丸子３丁目30番２号　キヤノン株式会社内

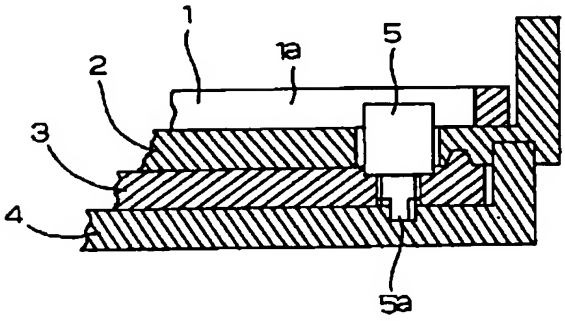
(74)代理人　弁理士　高梨　幸雄

(54)【発明の名称】　カメラの鏡筒構造

(57)【要約】

【目的】　固定筒２の内周面に回動自在に保持され、その回転位相により光軸方向位置を規定される差動筒３と、この差動筒３の位置に対応して規定され、回転位相を前記固定筒により規定される直進ガイド４と、前記固定筒２の外周部に位置して前記差動筒３に固定された駆動ピン５と、この駆動ピン５に回転方向の力を付与する駆動リング１とを有するカメラにおいて、部品点数を少なくして、コストダウン、組み立て工数の軽減を可能とする。

【構成】　前記直進ガイド４に設けられた円周方向の溝部に係合し該直進ガイドを前記差動筒に対し回動自在に保持し、かつ抜け止めを行なう突起５ａを前記駆動ピン５の先端に設けたこと。



1

【特許請求の範囲】

【請求項１】　撮影レンズ光学系を保持しカメラ本体に固定された固定筒と、この固定筒の内周面に回動自在に保持されるとともに、その回転位相によりその光軸方向位置を規定される差動筒と、この差動筒の内周側に位置しその光軸方向位置を前記差動筒の位置に対応して規定されるとともに回転位相を前記固定筒により規定される直進ガイドと、前記固定筒の外周部に位置して前記差動筒に固定された駆動ピンと、この駆動ピンに回転方向の力を付与する駆動リングとを有するカメラにおいて、前記直進ガイドに設けられた円周方向の溝部に係合し該直進ガイドを前記差動筒に対し回動自在に保持し、かつ抜け止めを行なう突起を前記駆動ピンの先端に設けたことを特徴とするカメラの鏡筒構造。

【請求項２】　撮影レンズ光学系を保持しカメラ本体に固定された固定筒と、この固定筒の内周面に回動自在に保持されるとともに、その回転位相によりその光軸方向位置を規定される差動筒と、この差動筒の内周側に位置しその光軸方向位置を前記差動筒の位置に対応して規定されるとともに回転位相を前記固定筒により規定される直進ガイドと、前記直進ガイドにより回転規制されるとともに、前記差動筒に形成されたカム溝によりその光学位置を規定される少なくとも２つのレンズ群保持部材とを有するカメラにおいて、前記直進ガイドは前記レンズ群保持部材の回転を規制する直進溝部を有するとともに該直進ガイド自身の回転を規制するキー部を前記直進溝部と同位相に形成したことを特徴とするカメラの鏡筒構造。

【請求項３】　撮影レンズ光学系を保持しカメラ本体に固定された固定筒と、この固定筒の内周面に回動自在に保持されるとともに、その回転位相によりその光軸方向位置を規定される差動筒と、この差動筒の内周側に位置しその光軸方向位置を前記差動筒の位置に対応して規定されるとともに回転位相を前記固定筒により規定される直進ガイドと、前記固定筒の外周部に位置して前記差動筒に固定された駆動ピンと、この駆動ピンに回転方向の力を付与する駆動リングとを有するカメラにおいて、前記固定筒と差動筒はヘリコイド結合されるとともに該固定筒は前記駆動ピンが貫通する溝部を有し、この溝部は前記駆動ピンとは嵌合しないように形成されていることを特徴とするカメラの鏡筒構造。

【請求項４】　撮影レンズ光学系を保持しカメラ本体に固定された固定筒と、この固定筒の内周面に回動自在に保持されるとともに、その回転位相によりその光軸方向位置を規定される差動筒と、この差動筒の内周側に位置しその光軸方向位置を前記差動筒の位置に対応して規定されるとともに回転位相を前記固定筒により規定される直進ガイドと、前記直進ガイドに形成された直進溝と、前記差動筒に形成されたカム溝に、その外周部に形成されたピンが係合することで光学位置を規定される少なくとも２つのレンズ群保持部材とを有するカメラにおいて、前記ピンは少なくとも前記直進ガイドに係合する部分までを、前記レンズ群保持部材と一体に形成されていることを特徴とするカメラの鏡筒構造。

2

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明はカメラの鏡筒構造に関するものである。

【０００２】

【従来の技術】図３は従来のカメラの鏡筒構造を示す一部の断面図であり、１０１は駆動リング、１０２は駆動リング１０１を外周面に嵌合しカメラ本体に固定される固定筒、１０３は固定筒１０２の内周部に位置し該固定筒に対して回転しつつ繰り出される差動筒、１０４は差動筒１０３と一体に繰り出され、前記固定筒１０２に設けられたキー溝に図示しない係合用突部が係合することにより回転方向の規制が行なわれる直進ガイド、１０５は前記差動筒１０３にネジ結合し、前記固定筒１０２に設けられたカム溝部１０２ａに係合し、さらにその先端を駆動リング１０１の直進溝部１０１ａと係合する駆動ピンである。

【０００３】図示しない各レンズ群保持部材は前記直進ガイド１０４の直進溝部（図示せず）及び前記差動筒１０３の内周部に形成された図示しないカム溝によりその位置を規制されており、前記駆動リング１０１を図示しない駆動手段により駆動することで、前記駆動ピン１０５が固定筒１０２のカム溝１０２ａに沿って繰り出され、その結果差動筒１０３は回転しながら繰り出される。

【０００４】この時、直進ガイド１０４は前記駆動ピン１０５に固着され、その一端がＬ字状に形成された抜け止め部材１０６の作用により差動筒１０３と共に繰り出されるが、図示しない係合用突部が固定筒１０２の直進ガイドキー溝に係合しているため、回転はしないで差動筒１０３と一体で繰り出されることになる。この差動筒１０３と直進ガイド１０４の相対回転により、各レンズ群保持部材は差動筒内でさらに繰り出され、いわゆる差動ズームが行なわれる。

【０００５】図４は前記直進ガイド１０４にフランジ部１０４ａを設け、このフランジ部１０４ａに設けたネジ穴１０４ｃに直進ガイド抜け止め部材１０６をネジ１０７で固定する構成となっている。

【０００６】図５は従来の別の例を示す一部の断面図、図６はその分解斜視図である。

【０００７】前記図３と同一部分には同一符号を付して重複説明を省略した図５，図６において、直進ガイド１０４は１レンズ群保持部材１０７の内周部に位置し、この１レンズ群保持部材１０７のキー溝部１０７ａと直進ガイド１０４の突起部１０４ａがキー結合し、１レンズ群保持部材１０７の回転規制が行なわれている。

【０００８】同様に、２レンズ群保持部材１１１及び３レンズ群保持部材１１２もそれぞれのキー溝部１１１ａ，１１２ａが前記直進ガイド１０４の突起部１０４ａとキー結合し回転規制が行なわれている。

【０００９】１０８は１レンズ群保持部材１０７の前端に取付けた化粧板、１０９は１レンズ群１１０のホルダ、１１３，１１４，１１５は１レンズ群保持部材１０７，２レンズ群保持部材１１１，３レンズ群保持部材１１２に形成した突起であり、この各突起１１３，１１４，１１５は差動筒１０３の内面に形成した凹部に係合している。

【００１０】

【発明が解決しようとする課題】しかしながら、上記従来例では、

（１）駆動ピン１０５に固着される抜け止め部材１０６が必要となり、部品増、組み立て工数の増大という問題点があった。

【００１１】（２）特に，図５、図６に示す従来例では、（イ）１レンズ群保持部材１０７は内周面に切り欠き状のキー溝１０７ａ，２，３レンズ群保持部材１１１，１１２の外周に切り欠き状のキー溝１１１ａ，１１２ａが必要なため、スペースを有効に利用できなくなる。

【００１２】（ロ）直進ガイド１０４は、その先端部が一周リング状につながっていない。そのため、先端部において、前記各レンズ群の回転規制を行なうには、根元部分１０４ｂの肉厚を厚くする必要があり、スペース上不利となる。また、その先端部がリング状につながっていないため、部品寸法精度が出しにくいという問題点があった。

【００１３】（３）固定筒１０２に形成されるカム溝１０２ａはモールド成形を行なうに際し、型構造上アンダーカットを避けるためにカム溝の途中にいわゆる型割り部が出来、その部分に段が生じ、その位置における光学位置保証が出来ない。そこで、カム溝を後加工することが必要となり、部品が高価になってしまうという問題点があった。

【００１４】（４）前述（２）の問題点を解決するために、図７に示すように直進ガイド１０４を１レンズ群保持部材１０７、２レンズ群保持部材１１１及び３レンズ群保持部材１１２の外周部に位置させたピン１１６，１１７，１１８を、前記直進ガイド１０４の直進溝部１０４ａ及び差動筒１０３のカム溝部１０３ａ，１０３ｂ，１０３ｃに係合させ、その位置を規定するように構成した場合は、次のような問題点が発生する。

【００１５】カメラの持ち運び最中に１レンズ群保持部材１０７の先端を机等にぶつけた時、その衝撃力はピン１１６とカム溝部１０３ａにより受止められる。この時、この衝撃力を受け止める部分とピン１１６を１レンズ群保持部材１０７にネジ止めしているネジ止め部１０７ａは、前記直進ガイド１０４の肉厚分離れているため、衝撃力に加え、ネジ部にはモーメント力が加わり、前記１レンズ群保持部材１０７の肉厚部分のみでの結合では強度上問題がある。

【００１６】さらに、この問題を解決するために１レンズ群保持部材１０７の内周部にナットを配置し、ピン１１６とナット（図示せず）とで前記１レンズ群保持部材１０７を挟み込むような構造にすると、部品増、コスト増、さらに、該ナット部を逃げるための切り欠き部が２レンズ群保持部材１１１に必要になるため、前述（２）のように、スペース効率上の問題点があった。

【００１７】本発明は上記のような問題点を解消したカメラの鏡筒構造を得ることを目的とする。

【００１８】

【課題を解決するための手段】請求項１の発明によれば、撮影レンズ光学系を保持しカメラ本体に固定された固定筒と、この固定筒の内周面に回動自在に保持されるとともに、その回転位相によりその光軸方向位置を規定される差動筒と、この差動筒の内周側に位置しその光軸方向位置を前記差動筒の位置に対応して規定されるとともに回転位相を前記固定筒により規定される直進ガイドと、前記固定筒の外周部に位置して前記差動筒に固定された駆動ピンと、この駆動ピンに回転方向の力を付与する駆動リングとを有するカメラにおいて、前記直進ガイドに設けられた円周方向の溝部に係合し該直進ガイドを前記差動筒に対し回動自在に保持し、かつ抜け止めを行なう突起を前記駆動ピンの先端に設けたことにより、コストダウン、組み立て工数の軽減が可能となる。

【００１９】請求項２の発明によれば、撮影レンズ光学系を保持しカメラ本体に固定された固定筒と、この固定筒の内周面に回動自在に保持されるとともに、その回転位相によりその光軸方向位置を規定される差動筒と、この差動筒の内周側に位置しその光軸方向位置を前記差動筒の位置に対応して規定されるとともに回転位相を前記固定筒により規定される直進ガイドと、前記直進ガイドにより回転規制されるとともに、前記差動筒に形成されたカム溝によりその光学位置を規定される少なくとも２つのレンズ群保持部材とを有するカメラにおいて、前記直進ガイドは前記レンズ群保持部材の回転を規制する直進溝部を有するとともに該直進ガイド自身の回転を規制するキー部を前記直進溝部と同位相に形成したことにより、スペース効率の向上、部品精度の向上、生産性の向上が可能となる。

【００２０】請求項３の発明によれば、撮影レンズ光学系を保持しカメラ本体に固定された固定筒と、この固定筒の内周面に回動自在に保持されるとともに、その回転位相によりその光軸方向位置を規定される差動筒と、この差動筒の内周側に位置しその光軸方向位置を前記差動筒の位置に対応して規定されるとともに回転位相を前記固定筒により規定される直進ガイドと、前記固定筒の外

5

周部に位置して前記差動筒に固定された駆動ピンと、この駆動ピンに回転方向の力を付与する駆動リングとを有するカメラにおいて、前記固定筒と差動筒はヘリコイド結合されるとともに、該固定筒は前記駆動ピンが貫通する溝部を有し、この溝部は前記駆動ピンとは嵌合しないように形成されていることにより、対衝撃性に優れたカメラを実現できる。

【００２１】請求項４の発明によれば、撮影レンズ光学系を保持しカメラ本体に固定された固定筒と、この固定筒の内周面に回動自在に保持されるとともに、その回転位相によりその光軸方向位置を規定される差動筒と、この差動筒の内周側に位置しその光軸方向位置を前記差動筒の位置に対応して規定されるとともに回転位相を前記固定筒により規定される直進ガイドと、前記直進ガイドに形成された直進溝と、前記差動筒に形成されたカム溝に、その外周部に形成されたピンが係合することで光学位置を規定される少なくとも２つのレンズ群保持部材とを有するカメラにおいて、前記ピンは少なくとも前記直進ガイドに係合する部分までを、前記レンズ群保持部材と一体に形成されていることにより、対衝撃性に優れ、スペース的にも有利なカメラを実現できる。

【００２２】

【実施例】図１は本発明の実施例を示す要部断面図、図２はその分解斜視図である。

【００２３】図１，図２において、１は図示しない駆動源からの力を、図示しない公知の動力伝達手段を介して与えられ回転する駆動リングであり、この駆動リング１に設けた直進溝部１ａ，１ｂ，１ｃは後記駆動ピン５に係合して回転力を付与する。２は図示しないカメラ本体に固定される固定筒であり、この固定筒２の外周面に前記駆動リング１を回動自在に嵌合保持するとともに３本のメスヘリコイド２ａが形成されている。

【００２４】３は固定筒２の内側に嵌合する差動筒であり、この差動筒３は端部外面に形成された３ケ所のオスヘリコイド３ａがそれぞれに対応するメスヘリコイド２ａとヘリコイド結合されている。また、上記固定筒２には、前記駆動ピン５が貫通する溝部２ｂが形成されており、駆動ピン５は該溝部を貫通しその先端部が前記駆動リング１の直進溝部１ａに嵌合する。

【００２５】４は前記差動筒３の内周部に回動自在に嵌合保持される直進ガイドである。５は駆動リング１の直進溝部１ａ、固定筒２の溝部２ｂを貫通して差動筒３のねじ穴３ｂに螺合された駆動ピンであり、ねじ穴３ｂを貫通した駆動ピン５のネジ先端部に形成された突部５ａが直進ガイド４の後端部近傍に形成された３ケ所の円周方向溝部４ａに係合している。

【００２６】従って、直進ガイド４は差動筒３と連動して繰り出される。この時、直進ガイド４の直進溝４ｂと同位相でその後端部に形成された３ケ所の突起４ｃは前記固定筒２の内周部に形成された直進溝部２ｃと係合しているため、回転せずに前記差動筒３に連動して光軸方向に移動する。

6

【００２７】６は図示しない１レンズ群を保持する１レンズ群保持部材であり、この１レンズ群保持部材６の略後端部には、前記直進ガイド４の直進溝部４ｂに係合する３ケの円柱状突起６ａが形成されており、この円柱状突起６ａの先端部には、差動筒３の内周部に形成された図示しない公知のカム溝に係合するピン７が嵌入される。

【００２８】８は公知のシャッター駆動ユニット及び被写体にピントを合せるためのレンズ駆動ユニットを具備する２レンズ群保持部材であり、この２レンズ群保持部材８の外周略後端部には、前記１レンズ群保持部材６と同様に直進ガイド４の直進溝４ｂと係合する略円柱状突起８ａ及び差動筒３の内周部に形成された図示しないカム溝に係合するピン８ｂが一体に形成されている。

【００２９】９は３レンズ群を保持する３群保持部材であり、この３レンズ群保持部材の外周部には２レンズ群保持部材８と同様の略円柱状突起９ａ及びピン９ｂが一体に形成されている。

【００３０】そして、前記の１レンズ群保持部材６，２レンズ群保持部材８，３レンズ群保持部材９の各略円柱状突起及びピンは前記直進ガイド４の突起部４ｃの内径切欠部４ｄをくぐりぬけるようにして、うしろから組み込まれてる。この時、前記差動筒３の内周面に形成された図示しないカム溝は、前記各レンズ群保持部材をうしろから組み込めるように光軸方向に後端部まで抜けている。そして、各レンズ群保持部材を組み込む位相は、カメラのズーム領域外である。

【００３１】次に上記実施例構成よりなるズームレンズ鏡筒のズーミング動作について説明する。

【００３２】図示しない駆動源からの駆動力を受けて駆動リング１が回転すると、直進溝部１ａに係合した駆動ピン５が回転し、同時に差動筒３を回転させる。この差動筒３のオスヘリコイド部３ａと、固定筒２のメスヘリコイド部２ａがヘリコイド結合されているから、差動筒３は固定筒２に対してヘリコイドに沿って繰り出される。

【００３３】この時、直進ガイド４は円周溝部４ａに前記駆動ピン５のネジ先端部５ａが係合しているので、前記差動筒３に連動して繰り出される。前記差動筒３は固定筒２に対し回転しながら繰り出されるが、直進ガイド４は突起部４ｃが固定筒２の内周部に形成された直進溝部２ｅと係合しているため、固定筒２に対して回転せずに繰り出されることになる。

【００３４】その結果、差動筒３と直進ガイド４は相対的に回転することとなる。前記各レンズ群保持部材６，８，９は円柱状突起６ａ，８ａ，９ａが直進ガイド４の直進溝部４ｂと係合することで、その回転が規制され、さらに、ピン７，８ｂ，９ｂが差動筒３の内周面に形成

7

された図示しないカム溝と係合していることで、その光軸方向位置が規定されている。

【００３５】このため、前記直進ガイド４と差動筒３の相対回転により、各レンズ群は前記差動筒３内に形成されたカム溝の軌跡に沿って光軸方向へ移動する。この時、前記差動筒３の繰り出し量を加えた量が各レンズ群の移動量となり、この量が光学設計上定められた量と一致するように前記差動筒内周面のカム溝は形成されている。以上の動作により各レンズ群は所定のズーム動作を行なうものである。

【００３６】上記実施例においては、各レンズ群保持部材６，８，９に設けたピン７，８ｂ，９ｂはテーパー状の円錐コロになっているが、これは駆動ピン５のような円柱状コロやその他の形状でもよい。

【００３７】また、上記実施例においては、各レンズ群保持部材６、８、９に形成した略円柱状突起６ａ，８ａ，９ａは直進ガイド４の直進溝４ｂに係合可能な形状であれば、四角柱形状やその他の形状でもよい。

【００３８】

【発明の効果】以上説明したように、請求項１の発明によれば、駆動ピンのネジ先端部に直進ガイドの円周方向溝部と係合する突部を設け、直進ガイドの抜け止めを行なうように構成したので、部品点数を少なくして、コストダウン、組み立て工数の軽減が可能となる。

【００３９】請求項２の発明によれば、直進ガイドの直進溝を後端部まで形成し、各レンズ群保持部材をうしろから組み込めるようにし、直進ガイドの略後端部に直進ガイド自身の回転を規制するキー状突部を形成し、この突部により直進溝部に肉をつなぐことを可能とするように構成したので、スペース効率の向上、部品精度の向上、生産性の向上が可能となる。

【００４０】請求項３の発明によれば、固定筒と差動筒をヘリコイド結合し、固定筒にはヘリコイドリードに一致し、駆動ピンが貫通する逃げ溝を形成したので、部品

8

をモールド化するための型構造上の問題を解決し、光学性能の向上となる。また、カメラを持ち運ぶ際、カメラの鏡筒先端部を机等をぶつけた時の衝撃力により、ヘリコイドが抜けかかると、駆動ピンが固定筒の逃げ溝に当接して上記衝撃力を吸収するため、対衝撃性に優れたカメラを実現できるとともに、その衝撃力により逃げ溝に駆動ピンによる打痕が残ったとしても光学性能上何ら問題とならない。

【００４１】請求項４の発明によれば、直進ガイドに形成された直進溝に、レンズ保持部材の外周部に形成されたピンを係合する構成としたので、前記と同様、対衝撃性に優れ、強度アップのためのナットの必要がなくスペース的にも有利である。

【図面の簡単な説明】

【図１】　本発明を実施したカメラの鏡筒構造を示す要部の断面図

【図２】　その要部の分解斜視図

【図３】　従来のカメラの鏡筒構造を示す一部の断面図

【図４】　図３の一部を変形した断面図

【図５】　従来のカメラの他の鏡筒構造を示す一部の断面図

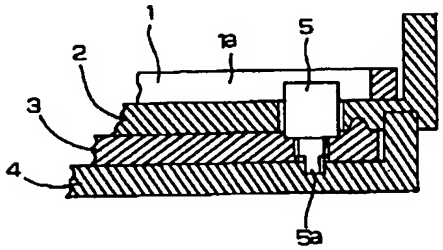
【図６】　図５の分解斜視図

【図７】　従来のカメラの更に他の鏡筒構造を示す一部の断面図

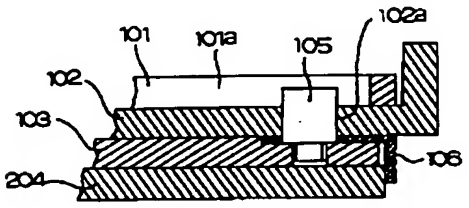
【符号の説明】

１　駆動リング
２　固定筒
３　差動筒
４　直進ガイド
５　駆動ピン
６　１レンズ群保持部材
７，８ｂ，９ｂ　ピン
８　２レンズ群保持部材
９　３レンズ群保持部材

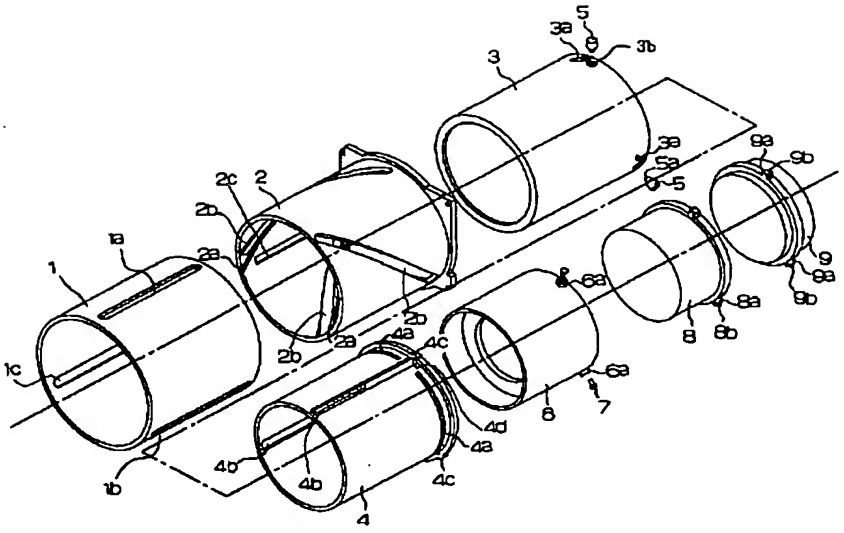
【図１】



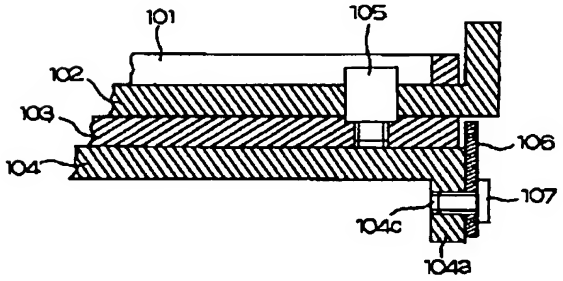
【図３】



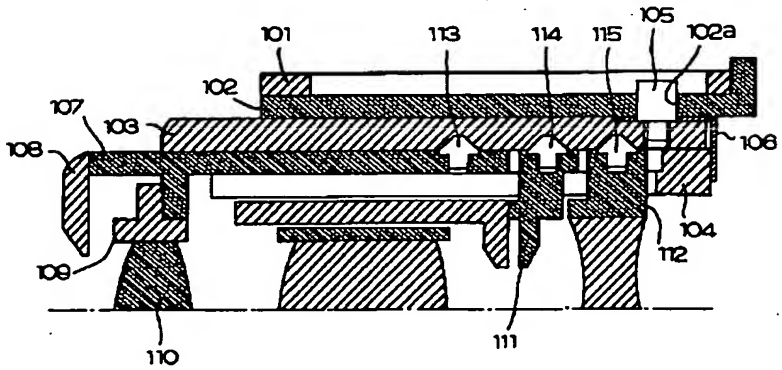
【図2】


5
3a
3b
3
3a
5a
5
9a
9b
9
9a
9b
8a
8b
8
6a
6a
7
8
2c
2
2b
1a
2a
1
1c
2b
2a
2b
4a
4c
4d
4a
4c
4b
4b
1b
4

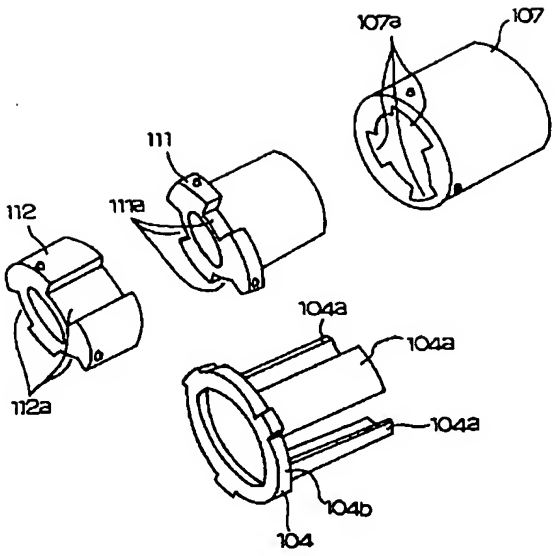
【図4】


101
105
102
103
106
104
107
104c
104a

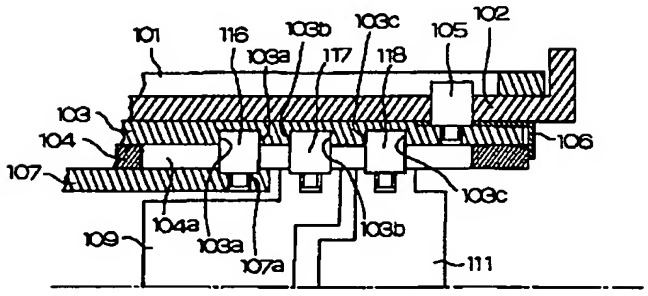
【図5】


101
113
114
115
105
102a
102
107
103
108
106
104
109
112
110
111

【図6】


107a
107
111
111a
112
112a
104a
104a
104a
104b
104

【図7】


101
116
103b
103c
105
102
103a
117
118
103
104
106
107
103c
104a
103b
109
103a
107a
111